DOCUMENT RESUME

ED 415 475 CG 028 252

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TITLE Development and Validation of a Multiple Intelligences Assessment Scale for Children.
PUB DATE 1997-08-15
NOTE 16p.; Paper presented at the Annual Meeting of the American Psychological Association (105th, Chicago, IL, August 15-19, 1997).
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Adolescents; Children; Cognitive Measurement; Construct Validity; Elementary Secondary Education; Intelligence Differences; *Intelligence Tests; *Test Construction; *Test Validity
IDENTIFIERS *Multiple Intelligences

ABSTRACT

Since Howard Gardner proposed the theory of multiple intelligences as an alternative to the unitary concept of general intelligence, educators have been searching for an acceptable method of assessment. To help with this search, three studies that describe the development and validation of a self- (and parent-) report measure of children's multiple intelligence disposition ("The Multiple Intelligence Developmental Assessment Scales for Children") (MIDAS-for-KIDS) are reported. In the first study, a preliminary version of the instrument was administered to 49 children and 74 parents. In the second study, 170 elementary school children and parents were used to examine item response patterns and scale consistency; in-depth interviews were conducted with 13 children. The third validation study involved over 2,100 children in grades K-8 from 5 states and across a range of socioeconomic levels. Exploratory factor analysis of the final 80-item version identified an appropriate 7-factor solution. This factor structure was confirmed on the other half of the sample. Findings indicate high internal consistency estimates, inter-rater ratings, and test-retest statistics. For the most part, scale scores also correlated in expected ways with appropriate criterion variables. Multiple intelligence definitions and tentative subscales, representative MIDAS items, lists of student activities as well as schools and programs, and seven tables are appended. (RJM)

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Development and Validation of a Multiple Intelligences Assessment Scale for Children

A Work in Progress

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Presented at 105th Annual Convention of the
American Psychological Association
at Chicago, Illinois
9:30am, August 15, 1997

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Three studies describe the development and validation of a self (and parent) report measure of children's multiple intelligence disposition, *The Multiple Intelligence Developmental Assessment Scales for Children* (MIDAS-for-KIDS). In the first study, a preliminary version of the instrument was administered to 49 children and 74 parents. Expert content review followed. In the second study, 170 elementary school children and parents were used to examine item response patterns and scale consistency. In-depth interviews were conducted with thirteen children. The third validation study involved over 2100 children in grades K - 8 from 5 states and across a range of socioeconomic levels. Exploratory factor analysis of the final 80 item version with half of the sample identified an appropriate 7 factor solution. This factor structure was confirmed on the other half of the sample. High internal consistency estimates, inter-rater ratings and test-retest statistics were obtained. For the most part, scale scores also correlated in expected ways with appropriate criterion variables. Further scale development is forthcoming guided by factor analysis results.

Since Howard Gardner proposed the theory of multiple intelligences as an alternative to the unitary concept of general intelligence in his book *Frames of Mind* (1993), educators across the country have been searching for an acceptable method of assessment. Gardner proposes that it is better to conceptualize intelligence as comprised of at least seven distinct yet complementary constructs: linguistic, logical-mathematical, musical, spatial, kinesthetic, interpersonal and intrapersonal. He is currently investigating an eighth intelligence, the naturalist.

Although multiple intelligence (MI) theory has been welcomed by many educators, wider acceptance and use has been limited by the lack of a practical, reliable and valid method of assessment. Gardner's definition of intelligence and his complex descriptions of the intelligences (Appendix #1) have made it difficult to create a psychometrically sound method of assessment. Indeed, Gardner challenges the basic assumption that intellectual prowess can be measured via paper-and pencil, objective, decontextualized tests.

The *Multiple Intelligence Developmental Assessment Scales* (MIDAS) were developed in 1987 to assess the seven intelligences for adolescents and adults (Shearer,

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1996). Research with the MIDAS has indicated that this instrument possesses acceptable psychometric properties including factor structure, item consistency, test-retest reliability and appropriate discrimination with various criterion groups and measures. These findings support the idea that an adolescent's or adult's perceived multiple intelligence disposition can be reasonably described by way of self or other report through the careful use and interpretation of the MIDAS Profile.

Building on the work with the MIDAS, the primary goals of this research were to develop multiple intelligence scales for pre-adolescent children in grades K - 8th, that (a) provide a profile of a child's developed skill levels in the seven identified constructs; (b) provide an estimate of intellectual propensity for two research scales, Innovation and Technical, and tentative subscales (c) demonstrate acceptable psychometric properties (e.g. scale reliability); (d) possess a sound factor structure and discriminate adequately between appropriate criterion groups; and (e) can be used effectively with children across a range of cultures, ages, abilities and socioeconomic status.

Initial Scale Construction

Scale construction took place over a period of two years and followed the format and style used in the original MIDAS questionnaire. An initial group of items was generated after a careful review of the behavioral characteristics associated with each intelligence appropriate for children as described by Howard Gardner in *Frames of Mind*. The goal was to make it easy for a child or parent to respond with a minimum of guesswork or generalization. The items inquire about observable behaviors representing specific skill domains within each construct as described by MI theory, e.g. writing for Linguistic and calculations for Math-logic. An attempt was made to write three or four questions regarding activities representing each designated skill domain within the seven constructs.

The items are written in one of three basic forms. Some items ask the informant to assess the frequency or duration of time the child spends engaged in an activity that characterizes the construct. Other questions ask the informant to provide a realistic evaluation of the child's performance on that activity. Still other questions ask the informant to provide an assessment of the child's enthusiasm for the activity. Response choices are uniquely written to fit the particular content of each question (see sample items in Appendix #2).

Each item has an "I don't know or Does not apply" choice so respondents are not forced to guess or assess an activity inappropriate to the child's age or experience. These responses are counted as *missing* and not figured into the scale scores. Scores for responses range from zero to four. On the questionnaire itself, response choices are marked by letter rather than by number to encourage respondents to respond to the descriptive choice rather than to a number. Percentage scores for each scale are calculated only from the total number of responses.

This initial body of 120 items was submitted for review by six elementary teachers trained in MI theory and two school psychologists were consulted. Two forms of the resulting 113 item questionnaire were devised, one for children (3rd grade and above) and a second for parents (K - 2nd grade). The reading difficulty of the children's questionnaire was estimated as being Easy at about the 5th grade level with a Reading

Ease score of 86.7 (Flesch Reading Ease). Within each scale items were grouped according to specific domains as is rationally consistent with MI theory to create tentative subscales (28), e.g., Instrument for Musical and Working with Numbers for Mathematical-Logical.

This 113 item questionnaire was then administered to a group of 49 children in grades K through 8 and 74 parents. Some participants were interviewed by a research assistant and others completed the questionnaire independently. Teachers at an MI designed school also administered the questionnaire to individual students and requested that parents complete it. All participants were provided with feedback opportunity to comment on the questionnaire when finished. General impressions and problem items were thus noted for future consideration.

Seventeen questions were eliminated from the item set based on low reliabilities and participants' suggestions. For example, "Did you have a hard time learning how to tie your shoes?" was eliminated because children could not remember this information. The question "Is it easy for you to keep the beat when you're clapping your hands or tapping your feet?" was simplified to "How well do you keep the beat when you clap your hands or tap your feet?"

The 96 remaining questions were then submitted for content review by subject area classroom teachers (art, physical education, music, reading and math). Two school counselors and two school psychologists reviewed the questionnaire for sex bias, age appropriateness. A trained research assistant also conducted in-depth interviews with seven children and parents. During these interviews the researcher inquired about the meaning of each question and the clarity of wording. The 96 item questionnaire was then revised so that item content adequately covered each domain within the designated MI construct. Problematic questions were also rewritten to be clear in their meaning and appropriate for range of targeted age groups.

The revised 96 item questionnaire was then administered by classroom teachers to 145 children and 25 parents for further item and scale analysis. Scale means, standard deviations and coefficient alphas were calculated. Items were subsequently modified or dropped from the scale if item-total correlations were low (i.e., $r \leq .30$) or the response pattern was skewed. Additional responses and suggestions by interviewees regarding item construction were considered. As a result of these analyses 16 items were eliminated so that the final 80 item instrument consisted of 7 main intelligence scales, 2 experimental scales (Technical and Innovative) and 23 tentative domain subscales.

A content review of the finalized item set was conducted to ensure that domain categories were adequately represented. Item content of the subscales ranged from 2 to 5 items. Type of questions included was also examined and found that 45 (56%) inquire about skills and 24 (30%) ask about amount of participation and 11 (14%) about expressed enthusiasm. The reading difficulty of the questionnaire was estimated as being Very Easy at about the 4th grade level with a Reading Ease score of 92.5 (Flesch Reading Ease). The parent's version of the instrument was also adjusted accordingly as is appropriate for an outside informant. It was found that all items could be translated into observable terms so that an informant might reasonably be able to rate particular activities in question.

Investigations into Reliability and Validity

The purposes of the third study were to (a) replicate the item analysis; (b) examine internal consistency estimates and interrater reliability, (b) explore the factor structure of the instrument; (c) investigate its concurrent and discriminant validity (i.e. correspondence between ratings on the MIDAS scales and appropriate criterion groups and measures).

Method

Participants

Parent and child permission were obtained again for children to participate in this project. The sample consisted of 106 kindergarten parents, 155 first grade parents, 148 second grade parents, 152 third grade students, 184 fourth grade students, 288 fifth grade students, 442 sixth grade students, 423 seventh grade students and 245 eighth graders (N=2,241) from 6 middle schools and 7 elementary schools in five states on the east coast, west coast and midwest. The schools were selected to represent a socio-economically diverse array of student backgrounds, ranging from large inner city neighborhoods, small towns, suburban and rural school districts (see school descriptions in Appendix #4). The sample included 1,142 (51%) girls. The mean age of the total sample was (SD= 10.8). 561 (25%) were African-American, 1,525 (68%) were White and the remainder (n=67 or 3%) were unclassified.

Measures

In addition to the 80 item revised MIDAS-for-KIDS questionnaire, teachers in two schools provided students' Verbal, Performance and Full Scale I.Q. scores from the Wechsler Intelligence Scale for Children (Wechsler, 1974) . These scores were used in several validity investigations described below.

Procedures

The 80 item questionnaire was administered to intact third through eighth grade classes following a standard set of instructions in 30 to 40 minute sessions by the teacher. Third grade teachers read the questionnaire aloud while students followed along. The parents of Kindergarten through second grade students completed the questionnaire at home and returned it a week later. Verbal, Performance and Full Scale I.Q. scores were obtained by teachers from student records Students in three schools also self reported participation in one or more activities of interest, curricular and extracurricular programs (see Appendix #3).

A group of 57 parents of children in a Academically Talented program at a middle school were asked to complete the instrument in addition to their child's self rating. The teacher of this program also provided the children's WISC-R scores.

Results

Results are presented in four sections: (a) reliability statistics: Alpha, inter-rater comparisons and temporal stability; (b) construct and criterion group validity: factor analyses, concurrent measures and contrasted groups.

Reliability

Intrascale reliabilities were calculated (see Appendix #5) and Alpha's ranged from a low of .83 for Kinesthetic and Linguistic to a high of .91 for Intrapersonal. These results indicate strong internal consistency for the seven scales. Similar results were obtained for the two research scales, Innovation (.82) and Technical (.83).

Comparative statistics between the parents' scale scores and the children's self assessment are provided in Appendix #6. Correlation coefficients between these two samples range from a low of .15 for Interpersonal to a high of .61 for Musical. All correlations are significant at least at the .05 level except for Interpersonal. The equality of the scale score variances was examined using Levene's Test for Equality of Variance and two scales were found to be significantly different, Interpersonal and Musical. The t-test for Equality of Means found only the Bodily scale to be significantly different ($p \leq .01$).

In a separate study, 93 8th grade students completed the questionnaire two times with a one week delay. Correlations for the seven main scales ranged from a low of .68 to .82 with most scales in the .8 range (see Appendix #7).

Validity

Factor Analyses

Exploratory factor analysis using a random sample of 908 of the total participants was conducted. Principal component analysis using Equamax rotation with Kaiser Normalization revealed seven factors that account for 43% of the total variance. An examination of the scree plot shows a noticeable drop after the seventh factor. Eigen values also drop more noticeably after the seventh factor (see Appendices #8 and #9). A confirmatory factor analysis was then conducted with on the second half of the sample of 909 participants. Strong congruency coefficients ranging from .97 to .98 were found.

The seven factor structure did not, however, display a clean pattern of items loading on a single factor only. Approximately 30% of the items were found to co-load on factors other than their designated scale. While nearly all of these co-loadings are theoretically consistent with multiple intelligences theory they produce the result of unfortunate pattern of unacceptably high inter-scale correlations. Inter-scale correlations range from .43 to .79 with a mean of 62.

Contrasted Groups

Appendix #10 displays the mean scale scores of the average student group and 12 criterion groups. Some of these groups were determined by teacher selection using various appropriate criteria (Miller South interest groups, LD, Academically Talented) and other groups were identified by way of students' self report of voluntary participation (orchestra, social groups, gymnastics, sports). Miller South is a middle school for Visual and Performing Arts. This is a selective, city-wide magnet school where students must pass an audition and have teacher recommendations. Most students have several years of instruction and training in their area of focus. The Dance, Vocal, Art, Drama and Music groups are Miller South students in these focus areas. All students have one focus area and some have two.

The Learning Disability (LD) group are students identified by teachers and testing who participate in resource room activities and are provided with individualized instruction to remediate academic or learning difficulties. The mean I.Q. scores for a group of 12 of these students are: Full Scale= 92, Verbal= 91 and Performance=96. The Academically Talented (AT) group are students in three enrichment programs selected primarily on the basis of high I.Q. scores. The IQ scores available for 50 students in this sample indicates a mean Full Scale score of 136, Verbal score of 136 and Performance score of 130.

The voluntary extra-curricular groups (Orchestra, Social, Gymnastics and Sports) are all middle school students in public schools. The Orchestra group consists of students who generally have several years of experience with their instruments. The Social group consists of students who indicated that they are members of any of three school organizations: student counsel, Peer Mediators and Circle of Friends. The Gymnastics group consists of students who have participated for at least one year in gymnastics instruction. The Sports group consists primarily of students who indicated participation in any of these sports activities: basketball, track, badminton and soccer.

The Average Students group is presented as an average group for comparative purposes. It is composed of undifferentiated public school students in grades 4 through 8th.

A comparative review of these mean scores reveals a pattern of differences that is logically consistent with MI theory. For example, Dancers and Gymnasts score highest on the Kinesthetic scale at 67% and 61% respectively while LD and AT groups both score the lowest at 55%. The Academically Talented group scored highest at 71% for the Logical-math scale while Gymnasts and LD groups lowest at 51% and 48% respectively.

Concurrent Comparisons

The teachers for two student groups (Academically Talented and LD, N=62) provided each students' Verbal, Performance and Full Scale scores from the Wechsler Intelligence Scale- Revised (WISC-R). The correlations between the 10 MIDAS scales and these scores are presented in Appendix #11 . The highest correlation is between the Linguistic scale and Verbal IQ ($r=.60$ $p<.001$). The next strongest and significant correlations also with the Verbal scale are for Logical ($r=.57$) and Intrapersonal ($r=.58$). Low and insignificant correlations with the Verbal scale are observed for Bodily ($r=-.04$), Spatial ($r=-.01$) and Interpersonal ($r=.14$).

The strongest correlations with Full Scale IQ are with Logical and Intrapersonal both at $r=.54$. Again, correlations with Bodily, Spatial and Interpersonal are low and insignificant. Logical and Intrapersonal are also the MI scales most strongly ($p<.01$) correlated with the Performance IQ at .39 and .36, respectively.

It is of interest to note that the Innovation scale fails to be correlated with any of the IQ scores but the Technical scale shows significant correlations across the board. Thus, supporting their differential validity. Overall, the strength and pattern of these correlations are statistically significant, theoretically meaningful and in the expected directions. The only deviation from the expected pattern is for the Spatial scale and its low correlation with Performance IQ. This is a puzzle but other data appear to indicate that the Spatial scale examines creative activities and divergent thinking skills rather than

logical, convergent problem-solving. This is supported by the negative correlation between Performance and Innovation and the significant, positive correlation with the Logical scale.

Discussion

The results of these studies illustrate sound psychometric properties of the MIDAS-for-KIDS when self-completed by children in grades 4th through 8th or parents of children in grades K - 2nd. The instrument evidenced moderate to high internal consistency across all studies and strong test-retest reliability over a 1-week period. Correlations between a child's self report and the parents' assessment were generally acceptable in the moderate range except for the Interpersonal scale. Convergent and discriminant validity was supported by appropriate patterns of correlations with WAIS-R scores as well as a contrasted groups study with criterion groups. Additionally, construct validity for the seven scales was supported by exploratory factor analysis followed by high congruency rates with a seven factor solution in a confirmatory factor analysis.

Certain limitations and recommendations resulting from the interpretations of these research results are required. Additional scale development is indicated based on the factor analysis which found an excessive number of co-loading items which results in high inter-scale correlations. Scale simplification may be obtained through the judicious elimination of a number of complex items that are weakly correlated with a designated factor.

Further scale development should then occur which will examine content and criterion related validity in light of both the factor structure and theoretical predictions. Cluster analysis should also be conducted to investigate subscale patterns within each main scale. This will enhance the effective interpretation of results for educational uses.

It must be noted that the MIDAS-KIDS is a measure of perceived intellectual disposition and as such the results need to be carefully reviewed for validity with the input of the person in light of other life experiences including grades, hobbies, test results and feedback from teachers. The MIDAS Profile is a product of the child's Intrapersonal awareness and psychological factors can influence the results such as depression, ego inflation and self criticalness. Strategies for interpreting the Profile and determining validity are available from the author.

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Appendix #1: M.I. Definitions and Tentative Subscales

Musical

To think in sounds, rhythms, melodies and rhymes. *To be sensitive to pitch, rhythm, timbre and tone. To be able to recognize, create and reproduce music by using an instrument or voice. Active listening and a strong connection between music and emotions.*

> **Musical Ability:** awareness of and sensitivity to music, rhythms, tunes and melody
> **Instrument:** skill and experience in playing a musical instrument
> **Vocal:** a good voice for singing in tune and along with other people
> **Appreciation:** actively enjoys listening to music

Bodily

To think in movements and to use the body in skilled and complicated ways *for expressive as well as goal-directed activities. It involves a sense of timing and coordination for whole body movement and the use of hands for manipulating objects.*

> **Physical Skill:** ability to move the whole body for physical activities such as balancing, coordination and sports
> **Dancing, Acting:** to use the body in expressive, rhythmic and imitative ways
> **Working with Hands:** to use the hands with dexterity and skill for detailed activities and small work

Math-Logical

To think of cause and effect connections and to understand relationships among actions*, objects or ideas. To be able to calculate, quantify, consider propositions and perform complex mathematical or logical operations. It involves inductive and deductive reasoning skills as well as critical and creative problem-solving.*

> **Problem Solving:** skill in organization, problem solving and logical reasoning; curiosity and investigation
> **Calculations:** ability to work with numbers for mathematical operations such as addition and division

Spatial

To think in pictures and to perceive the visual world *accurately. To be able to think in three-dimensions and to transform one's perceptions and re-create aspects of one's visual experience via imagination. To work with objects effectively.*

> **Imagery:** use of mental imagery for observation, artistic, creative, and other visual activities
> **Artistic Design**: to create artistic designs, drawings, paintings or other crafts
> **Construction:** to be able to make, build or assemble things

Linguistic

To think in words and to use language *to express and understand complex meanings. Sensitivity to the meaning of words as well as the order among words, their sounds, rhythms, inflections. To reflect on the use of language in everyday life.*

> **Linguistic Sensitivity:** skill in the use of words for expressive and practical purposes
> **Reading:** skill in reading
> **Writing:** ability and interest in writing projects such as poems, stories, books or letters
> **Speaking:** skill in oral communication for persuasion, memorization and description

Interpersonal

To think about and understand another person. To have empathy and recognize distinctions among people and to appreciate their perspectives with sensitivity to their motives, moods and intentions. It involves interacting effectively with one or more people in familiar, casual or working circumstances.

> **Understanding People:** sensitivity to and understanding of other people's moods, feelings and point of view

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> **Getting along with Others:** able to maintain good relationships with other people especially friends and siblings
> **Leadership:** to take a leadership role among people through problem solving and influence

Intrapersonal

To think about and understand one's self. *To be aware of one's strengths and weaknesses and to plan effectively to achieve personal goals. It involves reflecting on and monitoring one's r thoughts and feelings and regulating them effectively. The ability to monitor one's self in interpersonal relationships and to act with personal efficacy.*

> **Knowing Myself:** awareness of one's own ideas, abilities; personal decision making skill
> **Goal Awareness:** awareness of goals and self correction and monitoring in light of a goal
> **Managing Feelings:** ability to regulate one's feelings, moods and emotional responses
> **Managing Behavior:** ability to regulate one's mental activities and behavior

Innovative: To work in artistic, divergent and imaginative ways. To improvise and create unique answers, arguments or solutions.

Technical: To work accurately, carefully. To strive for just the right answer and perform activities in the exact way they are shown.

Appendix #2: Respresentative MIDAS Items

Musical:

Do you really like music classes, lessons or performing?
A= No, not at all
B= A little bit
C= Sometimes
D= Quite a bit
E= Very much so
F= I don't know or I never had the chance to try

How well do you keep the beat when you clap your hands or tap your feet?
A= Not very well
B= Well
C= Very well
D= Excellent
E= The best
F= I don't know

Appendix #3: Student Activities

1-Cross Country	2-Volleyball	3-Basketball	4-Wrestling	5-Track
6-Badminton	7-Gymnastics	8-Softball	9-Soccer	
10-Flag Football	11- Academic Team	12-Spirit Club	13- Newspaper	
14-yearbook	15- Circle of Friends	16-Peer Mediators	17- Chorus	
18-Band	19-Drama	20-Student Government		
21- Visual Art	22- Dance			

Appendix #4: Schools and Programs

		grades	program	area	n
Elementary:					
1	Small city	K - 6	all	Ohio	325
5	Large city	1 - 6	all	Ohio	105
7	Large, inner city	K - 5	all	Ohio	175
8	Suburban	5, 6	gifted & talented	Ohio	57
9	Small, rural	K - 6	all	Ohio	110
11	Small city	K - 6	all	Iowa	225
12	Town	K - 8	all	Calif.	90
Middle:					
15	Large, suburban	6, 7	all	Indianna	265
14	Small, rural	4,5,6	Gifted & Talented	Ohio	45
3	Small city	7, 8	Orchestra	Ohio	35
6	Large city	4 - 8	Visual & Performing Arts	Ohio	360
10	Mid-size, rural	7, 8	all	Ohio	210
13	Suburban	4 - 8	LD	Penn	15
2	Small city	7,8	all	Ohio	110

Appendix #5: Scale Internal Consistency
N= 1,817

	Alpha
Musical	.85
Kinesthetic	.83
Math-Logic	.90
Spatial	.86
Linguistic	.83
Interpersonal	.88
Intrapersonal	.91
Innovation	*.82*
Technical	*.87*

Appendix #6 : Parent - Child Interrater Statistics

	Sample					Equality of Variances	Equality of Means
	Self			Parent			
Scale	m	sd	r	m	sd	F	Value
Music	66	13	.61***	62	18	8.40**	1.38
Bodily	56	19	.49***	47	17	.31	2.71**
Spatial	56	19	.45***	52	20	.00	.92
Logical	72	15	.60***	73	14	1.11	.92
Linguistic	65	13	.37**	69	15	2.46	-1.54
Interper	63	13	.15	59	16	3.54*	1.30
Intraper	65	13	.34*	64	14	.69	.41
Innovate	57	16	.41**	54	15	.12	1.06
Technic	65	12	.46***	63	12	.55	1.10

Note. n= 53 * p≤ .05 ** p≤ .01 *** p≤ .001

Appendix #7: Test-Retest Correlations

8th grade students, one week delay

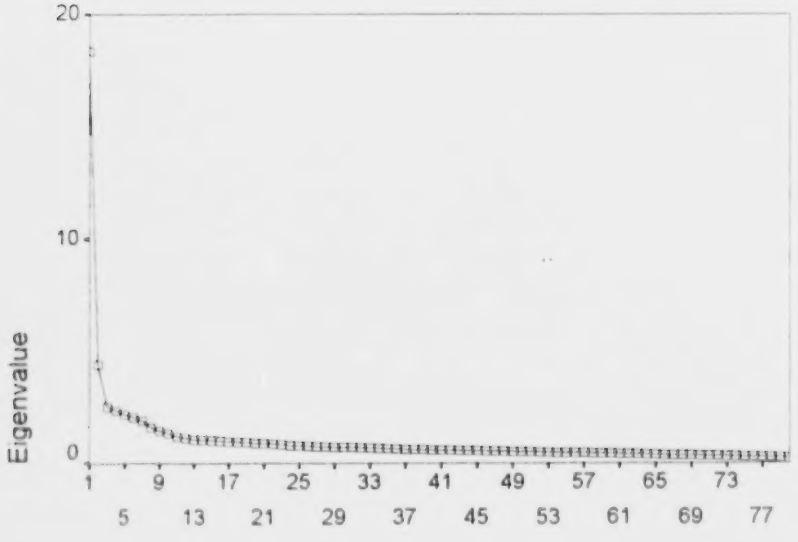
	r
Musical	.79
Kinesthic	.79
Math-logic	.90
Spatial	.68
Linguistic	.80
Interpersonal	.81
Intrapersonal	.82
Innovation	*.80*
Technical	*.81*

Note. N= 93 *All correlations p .001*

Appendix #8: Variance Accounted for by Each Factor

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	18.340	22.925	22.925	18.340	22.925	22.925	5.532	6.915	6.915
2	4.421	5.526	28.451	4.421	5.526	28.451	4.970	6.212	13.127
3	2.560	3.201	31.652	2.560	3.201	31.652	4.855	6.069	19.195
4	2.401	3.001	34.653	2.401	3.001	34.653	4.841	6.051	25.247
5	2.222	2.777	37.430	2.222	2.777	37.430	4.724	5.905	31.152
6	2.098	2.622	40.052	2.098	2.622	40.052	4.576	5.720	36.872
7	1.925	2.406	42.458	1.925	2.406	42.458	4.469	5.586	42.458
8	1.625	2.031	44.489						
9	1.468	1.835	46.325						
10	1.378	1.722	48.047						
11	1.216	1.520	49.566						
12	1.137	1.422	50.988						
13	1.068	1.336	52.324						
14	1.053	1.317	53.640						
15	1.040	1.300	54.940						
16	1.007	1.259	56.200						
17	972	1.215	57.414						
18	949	1.186	58.601						
19	947	1.184	59.784						

Scree Plot of Eigen Values



Appendix #9: Factor Structure Matrix using Equamax Rotation

	Logical	Intraper	Spatial	Interper	Music	Kinesth	Ling
IT24	.69						
IT30	.67						
IT26	.66						
IT23	.65						
IT22	.64						.34
IT27	.52		.33				
IT41	.49						.46
IT25	.49						
IT80	.34					.32	
IT67	.33	.32					
IT64		.59					
IT68		.50					
IT79		.49					
IT77		.47					
IT59		.47					
IT71	.38	.47					
IT50		.45					
IT54		.43					
IT72	.39	.41					
IT52		.40		.31			
IT73	.31	.40					
IT76		.39					
IT70		.39					
IT47	.33	.37					
IT78		.37					
IT69	.34	.37					
IT55		.36		.31			.32
IT63		.36		.34			
IT58		.33		.30			
IT62		.33					
IT29		.32				.30	
IT33			.68				
IT36			.63				
IT37			.60				
IT35			.60				
IT40			.60			.31	
IT32			.47	.33			
IT28			.45				
IT34	.36		.42			.40	
IT39			.41				
IT16			.38			.36	
IT31			.36				
IT46				.56			
IT61				.55			
IT75				.52			
IT56				.50			
IT65		.35		.50			
IT43			.34	.47			
IT57				.47			
IT60		.33		.45			
IT66				.42			.36
IT7				.39			
IT74				.37			
IT49				.30			
IT17							
IT9					.69		
IT8					.67		
IT18					.64	.32	
IT2					.60		
IT5					.56		
IT3	.33				.54		
IT21					.48	.32	
IT4				.36	.45		
IT10				.35	.44		
IT6				.44	.36		
IT45			.36	.33	.42		
IT42				.33	.34		.33
IT20						.73	
IT12						.67	
IT13						.59	
IT19						.54	
IT38						.53	
IT14						.49	
IT15						.46	
IT1							.70
IT11							.58
IT51							.55
IT44	.31						.54
IT48							.50
IT53			.35				.37

Note Values less that .295 printed as "."

Appendix #10. High and Low Mean Group Scores for MI Scales

Bodily

54% Average Students

High		Low	
m	Group	m	Groups
67	Dancers	55	Vocal
61	Gymnasts	55	LD
60	Drama	55	Gifted

Musical

56% Average Students

72	Musicians	54	Sports
69	Vocalists	53	Artists
67	Orchestra	49	LD

Spatial

57% Average Students

70	Artists	58	Sports
67	Gymnasts	56	Gifted
63	Musicians	52	LD

Logical-Math

53% Average Students

71	Gifted	52	Sports
64	Orchestra	51	Gymnasts
61	Musicians	48	LD

Linguistic

54% Average Students

66	Drama	56	Social
64	Vocalists	55	Sports
64	Orchestra	46	LD

Interpersonal

54% Average Students

64	Dancers	55	Gymnasts
63	Drama	55	Sports
63	Orchestra	49	LD

Intrapersonal

55% Average Students

68	Orchestra	57	Vocal
65	Dancers	57	Gymnasts
63	Gifted	47	LD

Innovative

52% Average Students

60	Drama	53	Sports
59	Orchestra	53	Social
58	Artists, Musicians, Dancers	48	LD

Technical

57% Average Students

65	Musicians	58	Artists, Gymnasts
64	Gifted, Dancers	56	Sports
62	Drama, Orchestra	50	LD

Appendix #11: Correlations Between MIDAS Scales and IQ Scores

	I.Q. Scores		
	Verbal	**Perform**	**Full Scale**
Scales			
Musical	.41***	.13	.32**
Bodily	-.04	-.06	-.05
Logical	.57***	.39**	.54***
Spatial	-.01	.09	.05
Linguistic	.60***	.22	.48***
Interpers	.14	.28***	.05
Intrapers	.58***	.36**	.54***
Innovate	*.23*	*-.04*	*.13*
Technical	*.46***	*.31**	*.44***

N= 62 (53 Gifted, 9 LD) * p≤ 05 ** p≤ 01 *** p≤ 001

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